

A multi-agency collaborative study



Arsenic in private bedrock wells in southeast New Hampshire

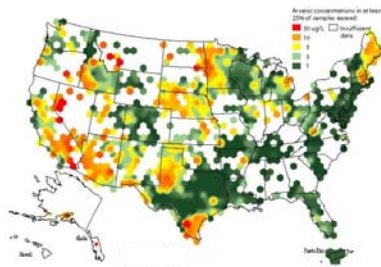


Objectives:

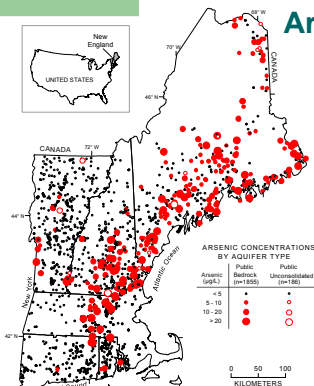
- Conduct a randomly designed study of arsenic occurrence and distribution
- Provide information to the citizens of the region on arsenic occurrence in private wells—37% of drinking water
- Provide a framework to investigate well water arsenic as it relates to geology



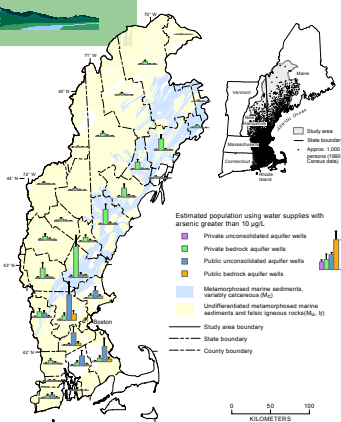
Arsenic in the U.S. Ryker, 2002



Arsenic in water from selected bedrock wells (ES&T, 2003)

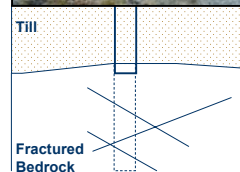


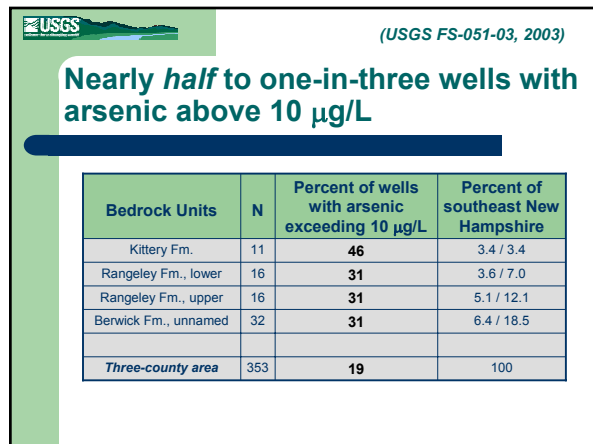
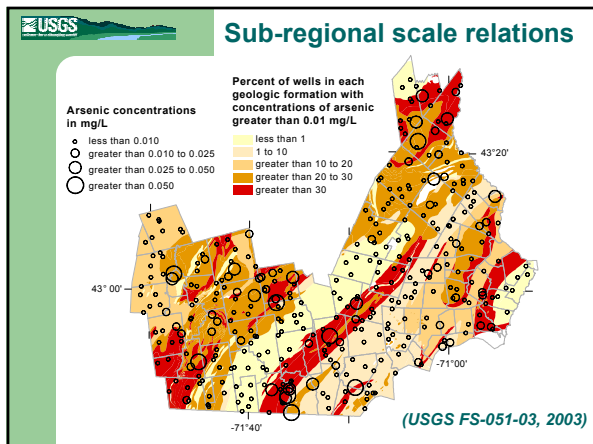
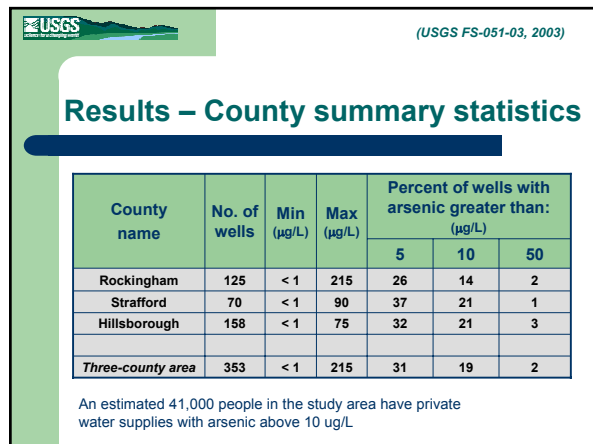
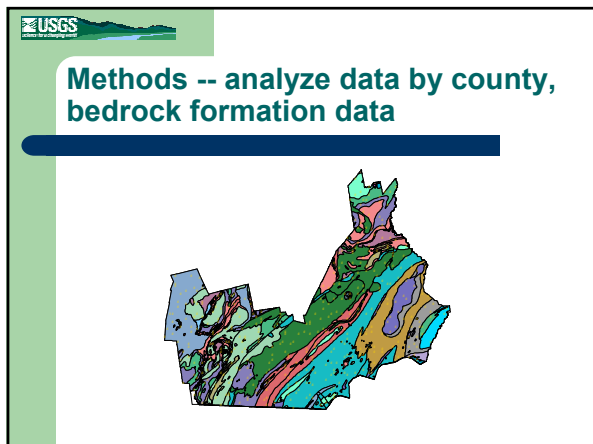
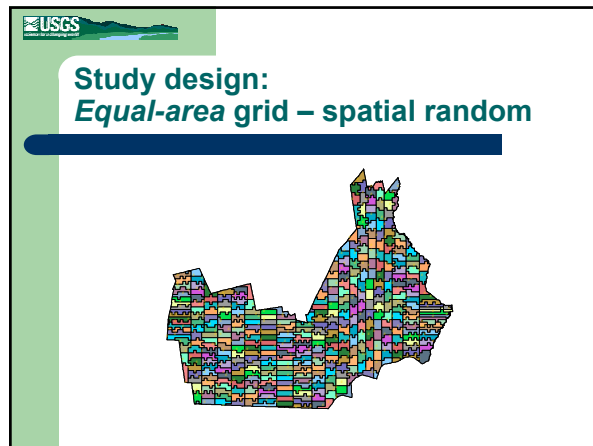
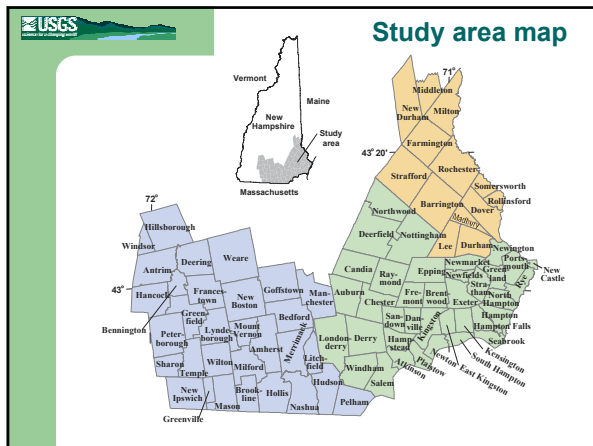
Estimated number of people with arsenic in water supplies (ES&T, 2003)

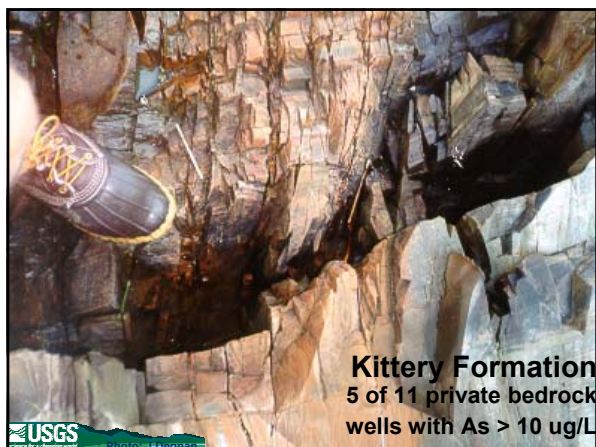


Private bedrock wells

About 40 percent of drinking water supply for Southeast NH







Reporting to homeowners:

Excerpted from results letters...

SITE ID	COLLECTION DATE	YOUR ARSENIC RESULT	NH DRINKING WATER STANDARD	COMPARISON TO DRINKING WATER STANDARD
120.1	7/24/02	215 µg/L	10 µg/L	EXCEEDS

New Hampshire Consortium on ARSENIC

Consortium brochure, mailed with results

A collaboration examining the effects of arsenic in drinking water on human health

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Reported water quality problems in private wells in southeast NH

Type of water quality problem reported	N	Percent of participants
Iron & Manganese	120	34
Sediment	88	25
Taste/Odor	43	12
pH	6	2
Radon	2	<1

Reported water treatment in private wells in southeast NH

Type of water treatment	N	Percent of participants
Sediment	63	18
Ion Exchange	46	13
Oxidizing	11	3
Reverse Osmosis	5	1
Combination	18	5

Survey findings:

- Over 90 % of participants use their well water for drinking water
- Fewer than 13 % of participants report testing for arsenic
- Fewer than 1% have treatment systems specifically designed to remove arsenic

USGS Fact Sheet 051-03
Montgomery et al, 2003

Final report recently released...

ARSENIC CONCENTRATIONS IN PRIVATE BEDROCK WELLS IN SOUTHEASTERN NEW HAMPSHIRE

MAJOR FINDINGS:

- Nearly one fifth (17 percent) of randomly selected private bedrock wells tested in southeastern New Hampshire contain concentrations of arsenic that exceed the U.S. Environmental Protection Agency's maximum contaminant level for public water supplies.
- An estimated 41,000 people in Hillsborough, Rockingham, and Strafford Counties may have private bedrock wells with concentrations of arsenic that exceed 6.000 milligrams per liter.
- Arsenic concentrations are similar in all three counties; however, the spatial distribution of arsenic concentrations that exceed 6.000 milligrams per liter is variable and varies in geology.
- Although most of the well owners (70 percent) reported that they use the water from their bedrock well for drinking, less than 14 percent had used for anything prior to this study.

INTRODUCTION

Southeastern New Hampshire is a rapidly growing region that has been identified as having evidence to high concentrations of arsenic in drinking water from ground water sources (Chapman and others, 2003; Aron and others, 1999; Press and others, 1999). Hillsborough, New Hampshire, consists of Hillsborough, Rockingham, and Strafford Counties (Fig. 1). Six percent of the population in these three counties live in the past 10 years. Although only about 11 percent of the population in New Hampshire's last two, more than 17 percent of the population in New Hampshire live in private wells as a source for drinking water (U.S. Census Bureau, 1990).

Previous studies have indicated that arsenic in ground water from bedrock wells is more prevalent in southeastern New Hampshire than in other areas of the State (Levine and others, 2003; Aron and others, 1999; Press and others, 1999). These studies also indicate that the arsenic in ground water probably has geologic origin. One potential explanation may be related to granite or gneiss bed rock.

Arsenic concentrations in public drinking water supplies in southern New Hampshire are regulated by the U.S. Environmental Protection Agency (USEPA) because of the arsenic and health risks. In 1996, the National Academy of Sciences concluded that the standard of 0.050 milligrams per liter (mg/L), equivalent to parts per million (ppm), in drinking water did not sufficiently protect the public from cancer. In response to the report, the USEPA revised the public drinking water standard from 0.050 to 0.010 mg/L (U.S. Environmental Protection Agency, 2001). The revised standard of 0.010 mg/L will be fully enforceable for public drinking water supplies by the year 2010.

The quality of drinking water obtained from private wells in New Hampshire is not regulated, even though private wells often are used for drinking water. Individual well owners should be aware of the arsenic in their wells and should consider testing their wells for arsenic. The U.S. Geological Survey (USGS) conducted an arsenic occurrence and distribution study in cooperation with the U.S. Environmental Protection Agency (USEPA, New England), the New Hampshire Department of Environmental Services (NHDES), the New Hampshire State Health Program, and the

USGS
U.S. Department of the Interior

1000 New Hampshire 051-03
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Summary:

- Hillsborough and Strafford Counties have more arsenic than previously thought: 1-in-5 wells have arsenic above 10 ug/L
- Fewer than 13% had tested for arsenic; less than 1% have arsenic removal systems
- Related to geology – some parts of towns may be high whereas other parts may be low
- Estimated 41,000 people with private supplies above 10 ug/L

Next steps...

- Determine occurrence and distribution of arsenic in adjacent counties
- Examine temporal variability of arsenic in ground water used for drinking water
- Design investigations to define processes controlling arsenic mobility in localized high-arsenic areas